

CLAIMS

1. A method of producing ink jet printed images with high resistance to physical and chemical damage on plastic surfaces, comprising the steps of:
 - 5 a. providing a plastic object;
 - b. coating at least part of the surface of the plastic object with an under-coating solution;
 - c. evaporating off the volatile part of the under-coated solution, thus depositing a solid film on the surface of the plastic object;
 - 10 d. providing at least one ink-jet ink comprising a colorant and aqueous carrier;
 - e. jetting the ink by means of an ink-jet system onto the surface of the under-coating on the plastic object;
 - f. warming the printed surface to drive part of the water in the ink into the under-coating and to evaporate the remaining part of the water;
 - 15 g. over-coating the dried surface with a water-based coating; and
 - h. heating the over-coating to dry or cure it and to seal-in the previously deposited ink and under-coating.
2. The method of claim 1, wherein the under-coating solution contains a mixture of hydrophilic polymer or polymers together with a hydrophobic polymer.
- 25 3. The method of claim 1, wherein the ink-jet ink colorant is a dye.

4. The method of claim 1, wherein the ink-jet ink colorant is a pigment.
5. The method of claim 1, wherein the plastic object is a card.
6. The method of claim 1, wherein the plastic object is a bottle.
7. The method of claim 1 where the plastic is polyester or polyvinyl chloride.
8. The method of claim 1, wherein said under-coating solution is aqueous.
9. The method of claim 8, wherein said aqueous solution comprises:
 - mixtures of polyvinyl alcohol and polyacrylic acid; and
 - water-based emulsion containing a hydrophobic polymer.
10. The method of claim 9 where the hydrophobic polymer has a pH of not more than 7.0.
11. The method of claim 1, wherein said under-coating solution is non-aqueous.
12. The method of claim 11, wherein said non-aqueous under-coating solution comprises:
 - organic solvent-based mixtures;
 - polyacrylic acid; and
 - a hydrophobic polymer.
13. The method of claim 12, wherein said non-aqueous under-coating solution additionally comprises a solvent soluble hydroxy alkyl cellulose.
14. The method of either one of claims 12 or 13, wherein the hydrophobic polymer is an acrylic thermoplastic polymer or co-polymer.
15. The method of either one of claims 1 through 13, wherein said under-coating solution additionally comprises titanium dioxide.

16. The method of either one of claims 1 through 8, wherein said under-coating solution additionally comprises a mixture of white or opaqueing pigments dispersed therein and fillers.
- 5 17. The method of claim 1, wherein said over-coating comprises water-soluble amino-plasts and acid catalysts.
18. The method of claim 1, wherein said over-coating comprises water-based emulsions.
19. The method of claim 1, wherein said over-coating comprises a water-based emulsion plus alkali.
- 10 20. The method of claim 1, performed as a single composite action, which is automated to the extent that at no stage involves human handling.
21. The method according to claim 1, wherein no chemical reaction occurs.
- 15 22. The method according to claim 1, wherein the under-coating is prepared industrially and supplied in sheet for subsequent imaging and over-coating by the user.
23. A plastic card coated and imaged according to the method of claim 1.
24. A plastic bottle coated and imaged according to the method of claim 1.
25. A plastic card under-coated, imaged and over-coated according to the
20 method of claim 22.
26. A plastic bottle under-coated, imaged and over-coated according to the method of claim 20.
27. An object imaged according to the method of claim 1, wherein the imaged surface is resistant to at least 100 strokes of the Crockmeter, dry

or in contact with solvents, thus exhibiting high physical and chemical resistance.

28. An object imaged according to the method of claim 1, wherein the coatings conform to FDA regulations for food products.

5 29. A method of producing ink jet printed images with high resistance to physical and chemical damage on plastic surfaces, comprising the steps of:

- a. providing a plastic object;
- b. under-coating at least part of the surface of the plastic object
10 with a solution containing a mixture of a hydrophilic polymer or polymers together with a hydrophobic polymer;
- c. evaporating off the volatile part of the under-coated solution,
 thus depositing a solid film on the surface of the plastic object;
- d. providing an ink-jet ink comprising a colorant and aqueous
15 carrier;
- e. jetting the ink by means of an ink-jet system onto the surface of
 the under-coating on the plastic object;
- f. warming the printed surface to drive part of the water in the ink
 into the surface coating and to evaporate the other part of the
20 water;
- g. over-coating the dried surface with a water-based coating; and
- h. heating the over-coating to dry it and to seal-in the previously
 deposited ink and under-coating.

30. The plastic bottle according to claim 24, wherein said ink-jet
25 image comprises a color image, additionally comprising a white

under-layer, said color image viewable without influence of any contents of said bottle.